UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,870	06/27/2003	Kentin L. Alford	BA4-158	7089

21567 7590 06/11/2007

WELLS ST. JOHN P.S.
601 W. FIRST AVENUE, SUITE 1300
SPOKANE, WA 99201

EXAMINER	
JOLLEY, KIRSTEN	
ART UNIT	**PAPER NUMBER**
1762	
MAIL DATE	**DELIVERY MODE**
06/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/607,870	ALFORD ET AL.	
	Examiner	Art Unit	
	Kirsten Jolley	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-18,30 and 32-42* is/are pending in the application.

4a) Of the above claim(s) *9-13 and 40-42* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-8, 14-18, 30, and 32-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1, 3-18, 30, and 32-42 are pending.

2. Claims 9-13 and 40-42 remain withdrawn from consideration as being drawn to a non-elected invention.

3. Upon further reconsideration of the application, the statement made in the first Office action that the limitations of claims 2 and 31 (which require exposing the surface to the precursor molecules in a supercritical fluid) were given a priority date of March 19, 1999 was incorrect. All claims are given a priority date of June 27, 2003, the filing date of the instant application, since the parent applications do not disclose the limitation of "a pressure of at least 30 psi." Because the parent applications did not have possession of or recite the specific pressures claimed (i.e., at least 30 psi), the priority date of the instant claims are given the priority date of the instant application. Accordingly, the 35 USC 102(e) rejections over Fukushima et al. have been reinstated. (The filing date of Fukushima et al. is December 4, 2001.)

Additionally, upon further search and consideration of the application, the Combes et al. reference is newly applied for the reasons set forth below.

Accordingly, this action is made non-final.

Claim Rejections – 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 3-4, 7, 14-18, 30, 32-35, and 38 are rejected under 35 U.S.C. 102(e) as being anticipated by Fukushima et al. (US 2002/0197879).

Fukushima et al. discloses a method of forming a monolayer of functionalized silicon on a substrate surface, the functionalized silicon including an organic group covalently attached with the silicon, the method comprising exposing the substrate surface to a silane precursor using supercritical carbon dioxide as a solvent (paragraph 0053), the precursor interacting with the substrate to form the monolayer across at least a portion of the surface of the substrate. Carbon dioxide is supercritical at pressures greater than 1073 psi.

As to claims 7, 30, and 38, Fukushima et al. teaches that the substrate may be glass in paragraph 0020. Further, with respect to independent claim 30, Fukushima et al. teaches use of an ITO coated glass in Example 3.

As to claims 14-15 and 33, Fukushima et al. teaches a film of water across a surface of the substrate and chlorosilane precursor in paragraph 0044.

As to claims 16-18, Fukushima et al. teaches exposing the substrate to the precursor molecules for a time of two hours, which meets the claimed limitations.

6. Claims 1, 3-6, 14-18, 30, and 32-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Combes et al. (US 5,725,987).

Combes et al. discloses a method of forming a layer of functionalized silicon on a substrate surface using supercritical carbon dioxide, the functionalized silicon including an organic group covalently attached with the silicon. Combes et al. discloses at col. 4, lines 50-55 that the organosilanes form a coating on the oxide substrates by reacting with surface OH groups on the oxide to form a surface-oxygen-silicon treated surface. While Combes et al. does not explicitly state that a monolayer is formed, since the coating is only formed by reaction of the organosilanes with surface OH groups, a monolayer must inherently be formed since reaction/coating will not continue once all of the OH surface groups are reacted. Combes et al. teaches using a pressure of 80-700 bar (col. 4), or 1160 to >10,000 psi.

As to claims 15 and 33, Combes et al. teaches using chlorosilane precursors in col. 5, lines 9-22. As to claim 14, Combes et al. teaches that there is atmospheric water in the reactor (col. 4, lines 21-23) which would necessarily form a film of water across a surface of the substrate. As to claims 16-18, Example I discloses exposing the substrate to the precursor for a time of 30 minutes.

Claim Rejections – 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 5-6 and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukushima et al.

As to claims 5-6 and 36-37, Fukushima et al. teaches an exemplary pressure of 1500 psi in Example 3. However Fukushima et al. states "the pressure and/or temperature of the compressed carbon dioxide is/are selectively controlled so as to enhance the density of the self-assembled monolayer on the substrate" (paragraph 0016). Fukushima et al. also states in paragraph 0053 "as used in the context of the present invention ... the term compressed carbon dioxide is intended to include also supercritical carbon dioxide." Therefore Fukushima et al. teaches that the pressure would be optimized through routine experimentation. It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

9. Claims 1, 3-8, 14-18, 30, and 32-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mankell et al. (US 2002/0127399) taken in view of Fukushima et al. or Combes et al.

Mankell et al. discloses a method of providing a glass fiber having a surface, and coating the glass fiber with a compound containing functionalized silicon including an

organic group covalently attached with the silicon. Mankell et all. teaches that the coating compound is preferably an alkyl silyl halide (paragraph 0015). Mankell et al. further teaches that the coating compound may be applied to the glass fiber prior to the addition of binder to the fiberglass during the formation of fiberglass batts (paragraph 0018). While Mankell et al. does not specifically state that the coating compound is applied as a monolayer, it is noted that the bonding mechanisms taught by Mankell et al. in paragraph 0015 are similar to those used in monolayers – namely, a compound with a first group that has functionality capable of interacting with the Si or OH groups on the fiberglass substrate, and another functional group (at the opposite end) having hydrophobic properties, thus providing hydrophobic properties to the coated substrate.

Mankell et al. lacks a teaching of exposing the glass fiber surface under a pressure of at least 30 psi. Fukushima et al. and Combes et al. are cited for their teachings of methods for forming a monolayer of functionalized silicon including an organic group on a substrate surface. Fukushima et al.'s and Combes et al.'s methods comprise exposing the substrate surface to a silane precursor using supercritical carbon dioxide as a solvent, the precursor interacting with the substrate to form the monolayer across the surface of the substrate. Fukushima et al. teaches that its process is useful on glass substrates (paragraph 0020), and results in an inexpensive, non-toxic and non-flammable process which facilitates formation of monolayers having good quality and surface integrity (paragraphs 0012-0013). Combes et al. teaches that its process is useful on silicon dioxide substrates—glass is made of silicon dioxide. It would have been obvious for one having ordinary skill in the art, seeing the references of Mankell et

al. and Fukushima et al. or Combes et al. in combination, to have used supercritical carbon dioxide as the solvent for applying the functionalized silicon compound on fiberglass fibers in the process of Mankell et al. with the expectation of improved quality and integrity of the coating, and because it is an inexpensive, non-toxic, non-flammable application process. Further, one having ordinary skill in the art would have expected successful results since Mankell et al. is not limited to the application method used and teaches that the coating composition can be applied in a suitable carrier (paragraph 0018), as well because Mankell et al. and Fukushima et al. and Combes et al. similarly teach coating of alkyl halyl silanes on glass/silicon dioxide substrates.

The dependent claims are rejected for the same reasons discussed above with respect to the Fukushima et al. and Combes et al. references.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Cao and McCarthy's "Formation of Trialkyl Silyl Monolayers on Si(100) Using Organosilanes in Carbon Dioxide" is cited for its similar teaching of using carbon dioxide under pressure of 950 psi to deposit a monolayer on a silicon wafer surface.

Enick et al. (US 6,183,815) is cited for its teaching of coating a metal surface with a monolayer comprising exposing the substrate surface to a thiol-containing precursor under pressure using liquid carbon dioxide as the solvent (col. 3, lines 63-67).

Yang et al. (US 6,716,378) is cited for its teaching of using pressure of 100,000-200,000 Pa (14.9-29 psi) to form a monolayer on at least a portion of the substrate.

Maracas et al. (US 5,669,303) is cited for its teaching of using pressure to form a self-assembled monolayer on at least a portion of the substrate.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten C. Jolley whose telephone number is 571-272-1421. The examiner can normally be reached on Monday to Tuesday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER

for

Kirsten C. Jolley
Primary Examiner
Art Unit 1762